

**REMARKS****INTRODUCTION:**

In accordance with the foregoing, claims 1 and 9 have been amended. No new matter is being presented, and approval and entry are respectfully requested.

Claims 1-13 are pending and under consideration. Reconsideration is respectfully requested.

**REJECTION UNDER 35 U.S.C. §112:**

In the Office Action, at pages 4-6, numbered paragraph 5, claims 1, 5, and 7-10 were rejected under 35 U.S.C. §112, second paragraph, for the reasons set forth therein. This rejection is traversed and reconsideration is requested.

Claim 1 has been amended to recite, in part: "...~~the~~a weight average molecular weight of poly(vinyl acetal)...", and the terminology ", and the organic binder is poly(vinyl acetal)" has been added. Thus, the antecedent basis for weight average molecular weight has been corrected, and the Examiner's concern about whether the organic binder resin comprises or is a poly(vinyl acetal) has been mooted by the addition of the terminology cited above. Since claims 5, 7, 8 and 10 depend from amended claim 1, claims 5, 7, 8 and 10 are submitted to be clear for at least the reasons that amended claim 1 is submitted to be clear.

Claim 9 has been amended to recite, in part, "wherein the charge generation material is amorphous titanylphthalocyanine, and ~~selected from the group consisting of phthalocyanine compounds and bisazo compounds and wherein the charge generation material is selected from the group consisting of phthalocyanine groups and bisazo compounds, or~~ a ratio of amorphous titanylphthalocyanine to the organic binder resin in a coating liquid is adjusted so that a ratio of a weight of the charge generation material to the organic binder resin in the charge generation layer that is coated and dried is in a range from 7/3 to 5/5." Thus, claim 9 recites that the charge generation material is amorphous titanylphthalocyanine prior to the description of the ratio. It is respectfully submitted that the terminology concerning the ratio of the amorphous titanylphthalocyanine to the organic binder resin is in addition to the terminology reciting that the charge generation material is amorphous titanylphthalocyanine, i.e., that the claim does not recite that the charge generation material is a ratio, and thus is unambiguous.

Hence, it is respectfully submitted that claims 1, 5, and 7-10 are allowable under 35 U.S.C. §112, second paragraph.

**REJECTION UNDER 35 U.S.C. §112:**

In the Office Action, at pages 6-9, numbered paragraph 7, claims 1, 5, and 7-10 were rejected under 35 U.S.C. §112, first paragraph, for the reasons set forth therein. This rejection is traversed and reconsideration is requested.

It is respectfully submitted that "the weight average molecular weight of the organic binder resin" is described in paragraph 15 of the specification:

The above aspect is attained by a multi-layered organic electrophotographic photoconductor comprising a conductive substrate and layers including an undercoat layer containing thermosetting resin, a charge generation layer containing a charge generation material and an organic binder resin, and a charge transport layer laminated in the cited order on the substrate, wherein the polydispersity defined by a ratio of weight average molecular weight to number average molecular weight of the organic binder resin is at least 4.0, and the weight average molecular weight is at least  $7.0 \times 10^4$  in a distribution of polystyrene-converted molecular weight obtained by gel permeation chromatography.

Since claim 1 has been amended to recite that the organic binder is poly(vinyl acetal), claim 1 is submitted to be clear under 35 U.S.C. §112, second paragraph.

Paragraph 36 of the specification recites:

The molecular weight distribution of the organic binder resin in a charge generation layer specific in an embodiment of the present invention may be attained by a single type of resin. However, a mixture of plural types of organic binder resins is preferable since the actual adjustment is easier using a mixture of the plural types of binder resins. A preferable mixture for enhancing the adhesion ability is obtained by mixing **low molecular weight poly(vinyl acetal)** having a polystyrene-converted weight average molecular weight of  $1.0 \times 10^4$  to  $7.0 \times 10^4$  with medium to high molecular weight poly(vinyl acetal) having a polystyrene-converted weight average molecular weight of  $8 \times 10^4$  to  $1.8 \times 10^5$ . Each resin of such a mixture has a molecular weight distribution before mixing that has an overlapping range. Gel permeation chromatography of the mixture has demonstrated one continuous molecular weight distribution after mixing. In an embodiment of the present invention, the binder resin used in the charge generation layer is preferably a mixture of two or more types of resins that have different weight average molecular weights and have an overlapping range in their molecular weight distributions. (emphasis added)

Hence, it is respectfully submitted that it is clear that the specification indicates that there is a component present in the organic binder resin. For example, as noted above, a low molecular weight poly(vinyl acetal) may be a component of the organic binder resin.

Claim 1 has been amended to recite more clearly that the organic binder is poly(vinyl acetal). Thus, it is clear that there is an adequate written description of the limitation "wherein polydispersity defined by a ratio of a weight average molecular weight to a number average

molecular weight of the organic binder resin is at least 4.0, and ~~the~~ a weight average molecular weight of poly(vinyl acetal) utilized in the organic binder resin is at least  $7.0 \times 10^4$  in a distribution of a polystyrene-converted molecular weight obtained by gel permeation chromatography, and the organic binder is poly(vinyl acetal)" (emphasis added). Since claims 5, 7, 8 and 10 depend from amended claim 1, claims 5, 7, 8 and 10 are submitted to be clear for at least the reasons that amended claim 1 is submitted to be clear.

It is respectfully submitted that the original specification, paragraph 36 recites:

The molecular weight distribution of the organic binder resin in a charge generation layer specific in an embodiment of the present invention may be attained by **a single type of resin**. However, **a mixture of plural types of organic binder resins is preferable** since the actual adjustment is easier using a mixture of the plural types of binder resins. **A preferable mixture for enhancing the adhesion ability is obtained by mixing low molecular weight poly(vinyl acetal) having a polystyrene-converted weight average molecular weight of  $1.0 \times 10^4$  to  $7.0 \times 10^4$  with medium to high molecular weight poly(vinyl acetal) having a polystyrene-converted weight average molecular weight of  $8 \times 10^4$  to  $1.8 \times 10^5$ .** Each resin of such a mixture has a molecular weight distribution before mixing that has an overlapping range. Gel permeation chromatography of the mixture has demonstrated one continuous molecular weight distribution after mixing. In an embodiment of the present invention, the binder resin used in the charge generation layer is preferably a mixture of two or more types of resins that have different weight average molecular weights and have an overlapping range in their molecular weight distributions. (emphasis added)

Hence, it is respectfully submitted that it is clear that the original specification recites that **a single type of resin may be used**. That is, the statement that "a single type of resin may be used" is broad enough to encompass poly(vinyl acetal) resins that are not represented by Formula (1).

It is respectfully submitted that the term polyvinyl acetal is known to those skilled in the art, and that further description of the term is unnecessary. For example, in the Regal Plastic Plastics Reference Handbook, Copyright 1999-2000 includes in its Technical Data Glossary, p. 23, a copy of which is provided herein, a definition of polyvinyl acetal:

## **Polyvinyl Acetal**

A member of the family of vinyl plastics, polyvinyl acetal is the general name for resins produced from a condensation of polyvinyl alcohol with an aldehyde. There are three main groups: polyvinyl acetal; polyvinyl butyral, and polyvinyl formal. Polyvinyl acetal resins are thermoplastics which can be processed by casting, extruding, molding, and coating, but their main uses are in adhesives, lacquers, coatings, and films.

Hence, it is respectfully submitted that the terminology poly(vinyl acetal) is known to those skilled in the art, and that the originally filed specification does provide an adequate written description of the term "poly(vinyl acetal)."

Claim 9 has been amended and is now submitted to be in allowable form.

Thus, claims 1, 5, and 7-10 are submitted to be in allowable form under 35 U.S.C. §112, first paragraph.

### **WITHDRAWAL OF ALLOWABILITY OF CLAIM 9:**

In the Office Action, at pages 9-10, numbered paragraph 8, the Examiner withdrew the allowability of claim 9 due to the amendment to claim 9 filed December 23, 2004.

Claim 9 has been amended and is now submitted to be in allowable form.

### **REJECTION UNDER 35 U.S.C. §103:**

A. In the Office Action, at pages 10-17, numbered paragraph 10, claims 1, 2, 5-7, 9, and 10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent 2002-107972 (hereafter, JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (hereafter, Yashiki), as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification. The reasons for the rejection are set forth in the Office Action and therefore not repeated. The rejection is traversed and reconsideration is requested.

Independent claims 1 and 9 have been amended to show more clearly differences from

the cited references.

It is respectfully submitted that cited reference JP '972 discloses an organic electrophotographic photoconductor whose structure is substrate/intermediate layer/undercoating layer/charge generation layer/charge transport layer. Cited reference Yashiki also discloses the same structure.

In contrast, the present invention photoconductor's structure is substrate/undercoat layer/charge generation layer/charge transport layer. Amended claim 1 states that an undercoat layer is in contact with a substrate and a charge generation layer.

Thus, the structure of the present invention is submitted to be different from the structure of the cited references. Additionally, the undercoat layer of the present invention is different from the intermediate layer of the references with respect to the purpose and the function.

Hence, it is respectfully submitted that amended independent claims 1 and 9 are patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki). Since claims 2, 5-7 and 10 depend from amended claim 1, claims 2, 5-7 and 10 are submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki) for at least the reasons that amended claim 1 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki).

B. In the Office Action, at pages 17-19, numbered paragraph 11, claim 8 was rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent 2002-107972 (JP'972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki), as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above, further combined with U.S. 5,302,479 (Daimon), as evidenced by DERWENT abstract Acc. No. 1992-392116. The reasons for the rejection are set forth in the Office Action and therefore not repeated. The rejection is traversed

and reconsideration is requested.

As noted above, amended independent claim 1 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki) as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above.

Since claim 8 depends from amended claim 1, claim 8 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki) as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above for at least the reasons that amended claim 1 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki) as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above.

It is respectfully submitted that Daimon recites an electrophotographic photoreceptor having hydroxygallium phthalocyanine **crystals** as the photoconductive material in the light-sensitive layer (see col. 6, lines 56-60 of Daimon). In contrast, the present invention (see amended claim 1) **does not utilize crystals**, but instead utilizes "a charge generation layer containing charge generation material and organic binder resin directly on the undercoat layer." As further described in the specification, paragraph 34: "**Selection of a solvent for the coating liquid is important** to obtain a favorable dispersion condition and to form a homogeneous charge generation layer. **The solvent for the coating liquid of the charge generation layer** of embodiments of the invention may be selected from an aliphatic hydrocarbon halide, for

example, methylene chloride or 1,2-dichloroethane, a hydrocarbon having an ether linkage, for example, tetrahydrofuran, a ketone, for example, acetone, methyl ethyl ketone, or cyclohexanone, an ester, for example, ethyl acetate, and an ether, for example, ethyl cellosolve (ethylene glycol monoethyl ether)" (emphasis added).

See also, paragraph 56, lines 1-2: "A charge generation layer 0.2  $\mu\text{m}$  thick was formed by **dip-coating on the undercoat layer with a coating liquid and drying at 80°C for 30 min**" (emphasis added). Hence, it is respectfully submitted that claim 8 of the present invention does not utilize crystals in the charge generation layer as is described by Daimon, and is thus allowable over Daimon, and even if Daimon is combined with Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki), claim 8 is allowable over the combination.

Thus, it is respectfully submitted that claim 8 is patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP'972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki), as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above, further combined with U.S. 5,302,479 (Daimon), as evidenced by DERWENT abstract Acc. No. 1992-392116.

C. In the Office Action, at pages 20-22, numbered paragraph 12, claim 8 was rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent 2002-107972 (JP'972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki), as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above, further combined with U.S. 6,180,301 (hereafter, Mayo), as evidenced by DERWENT abstract Acc. No. 1992-392116. The reasons for the rejection are set forth in the Office Action and therefore not repeated. The rejection is traversed and reconsideration is requested.

As noted above, amended independent claim 1 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki) as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above.

Since claim 8 depends from claim 1, claim 8 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki) as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above for at least the reasons that amended claim 1 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP '972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki) as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above.

It is respectfully submitted that it is improper to use hindsight reconstruction to argue obviousness. In In re Dembiczak, the court noted that:

Measuring a claimed invention against the standard established by section 103 requires the oft-difficult but critical step of casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field.

In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). One "cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1780, 1783 (Fed. Cir. 1988). "Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability--the essence of hindsight." Dembiczak, 175 F.3d at 999, 50 USPQ2d at



1617. "When a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references." In re Rouffet, 149 F.3d 1350, 1355, 47 USPQ2d 1453, 1456 (Fed. Cir. 1998) (citing In re Geiger, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987)).

It is respectfully submitted that there is no teaching or suggestion of combining the teachings of Mayo with JP '972 as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki) as evidenced by applicant's admission. The Examiner appears to be using the invention as a blueprint to determine, with hindsight, what needs to be combined to generate the present invention. As noted by the court, such hindsight is not appropriate. It is the nature of invention itself to combine what has not previously been combined to determine a new invention. Just looking back and seeing how the inventor(s) combined known elements to determine the new invention is not sufficient to show obviousness.

Mayo does not recite a multi-layered organic electrophotographic photoconductor comprising: a conductive substrate, having an undercoat layer containing a thermosetting resin, wherein the undercoat layer is formed directly on the substrate, a charge generation layer containing charge generation material and organic binder resin, wherein the charge generation layer is formed directly on the undercoat layer, and a charge transport layer formed directly on the charge generation layer, wherein polydispersity defined by a ratio of a weight average molecular weight to a number average molecular weight of the organic binder resin is at least 4.0, and a weight average molecular weight of poly(vinyl acetal) utilized in the organic binder resin is at least  $7.0 \times 10^4$  in a distribution of a polystyrene-converted molecular weight obtained by gel permeation chromatography, and the organic binder is poly(vinyl acetal), as is recited by amended claim 1 of the present invention. There is no teaching or suggestion of combining Mayo with the plurality of other cited references.

Hence, amended claim 1 is submitted to be patentable over Mayo, and even if Mayo were combined with JP '972 as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki) as evidenced by applicant's admission, there is no showing that the particular structure and characteristics of the present invention would be obtained. Thus, amended claim 1 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP'972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki), as evidenced by applicant's admission that melamine is a thermosetting

resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above, further combined with U.S. 6,180,301 (Mayo), as evidenced by DERWENT abstract Acc. No. 1992-392116.

Since claim 8 depends from amended claim 1, claim 8 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP'972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki), as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above, further combined with U.S. 6,180,301 (Mayo), as evidenced by DERWENT abstract Acc. No. 1992-392116 for at least the reasons that amended claim 1 is submitted to be patentable under 35 U.S.C. §103(a) over Japanese Patent 2002-107972 (JP'972), as evidenced by Grant & Hackh's Chemical Dictionary, page 277 and the CRC Handbook of Chemistry and Physics, 48th edition, page B-177; combined with US 4,518,669 (Yashiki), as evidenced by applicant's admission that melamine is a thermosetting resin and that titanium oxide can be used as the fine particles that perform the functions of scattering exposed light and transporting photo-generated charges to the substrate disclosed in paragraph 0030 of the instant specification, as applied to claim 1 above, further combined with U.S. 6,180,301 (Mayo), as evidenced by DERWENT abstract Acc. No. 1992-392116.

#### **ALLOWABLE CLAIMS:**

In the Office Action, at page 22, numbered paragraph 13, claims 3, 4 and 11-13 were allowed over the prior art of record.

Applicant thanks the Examiner for the careful review of the claims and allowance of claims 3, 4 and 11-13.

#### **CONCLUSION:**

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot, and further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

Serial No. 10/645,879

Docket No. 1639.1035

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date:

June 27, 2005

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## **PLASTICS REFERENCE HANDBOOK**

# **REGAL PLASTIC SUPPLY COMPANY**

## **PLASTICS REFERENCE HANDBOOK**

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# INTRODUCTION

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Established in 1954, Regal Plastic Supply Company is considered one of the foremost pioneers in the plastic distribution industry. Throughout the years, the innovative "customer-oriented plan for success" thinking has become a credible trademark our customers rely on. Fortifying that philosophy, Regal introduced its Plastic Materials Reference Guide in 1984. As products and industries continue to evolve, so does this compilation of technical data. We view providing our customers with tools for effective planning and purchasing as important as meeting product "supply and demand". You will find this guide an invaluable reference source for researching or finding the answer pertaining to your plastic application. The product information contained herein covers the most commonly used materials; it does not reflect our total capacity.

True customer service is a thought process not developed overnight. Our experience and stability in the industry gives Regal the opportunity to assist you in your plastics endeavors as you utilize staff who are accessible, knowledgeable and resourceful with regard to all inquiries.

We invite you to visit the Regal Plastic Supply Company location in your vicinity. All locations maintain generous inventories of plastic sheet, rod, tube, film, and numerous finished products.

Regal Plastic Supply Company thanks all of our customers for their patronage over the years. We will continue in our efforts to provide the best in JIT inventory and personal service. Plastic is in your future and Regal Plastic Supply Company is your best source.

Sincerely yours,

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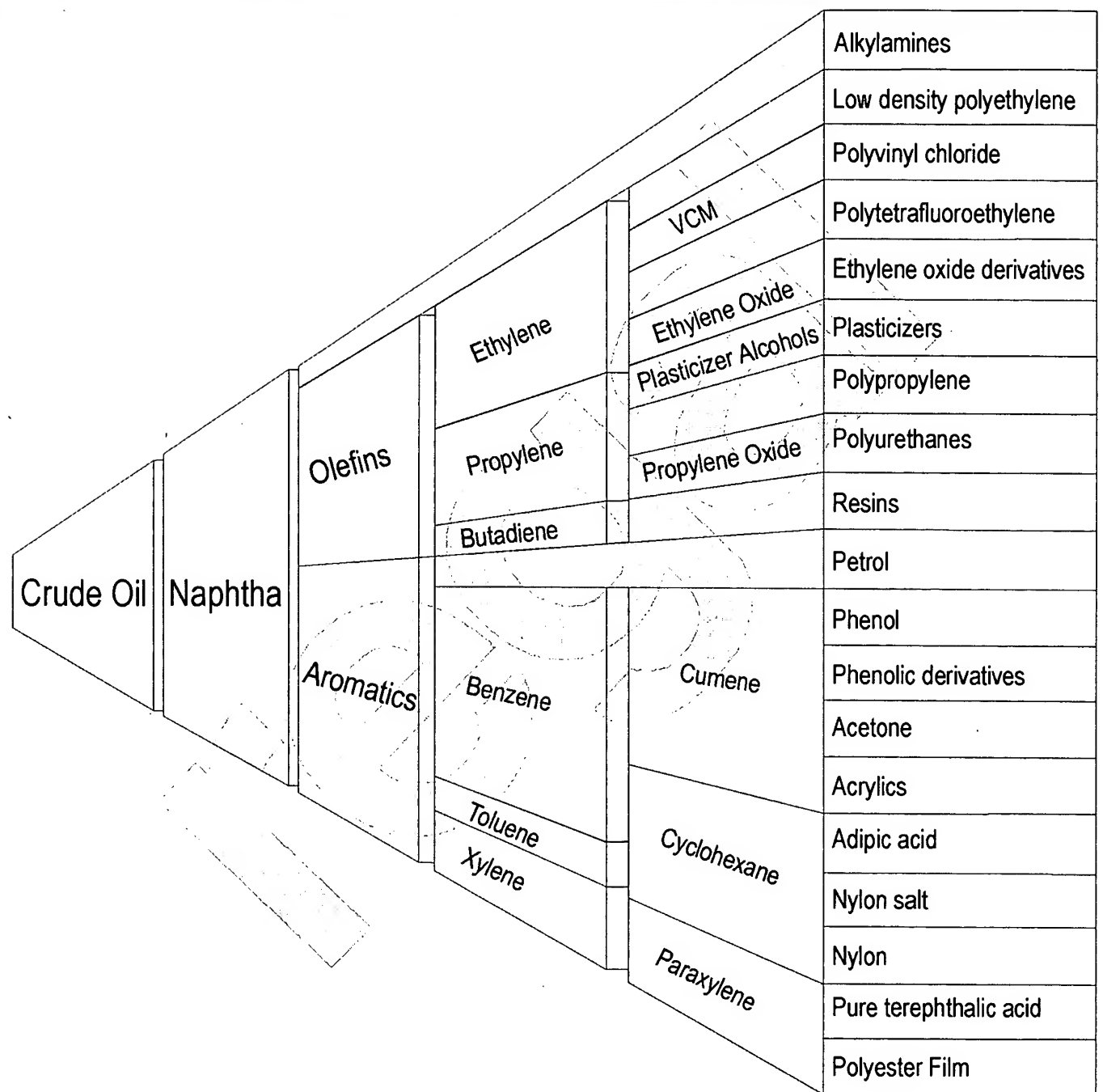
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## INTRODUCTION

## The Origins of Plastic Materials





### Platform Blowing

A special technique for blowing large parts. To prevent excessive sag of the heavy parison, the machine employs a table which, after rising to meet the parison at the die, descends with the parison at a slightly lower rate than the parison extrusion speed.

### Plug-And-Ring

Method of sheet forming in which a plug, functioning as a male mold, is forced into a heated plastic sheet held in place by a clamping ring.

### Plug Forming

A thermoforming process in which a plug or male mold is used to partially preform the part before forming is completed using vacuum or pressure.

### Pock Marks

Irregular indentations on the surface of a blown container caused by insufficient contact of the blown parison with the mold surface. They are due to low blow pressure or air gas entrapment of moisture condensation on the mold surface.

### Polishing Roll(s)

A roll or series of rolls, which have a highly polished chrome plated surface, that are utilized to produce a smooth surface on sheet as it is extruded.

### Polybutylene

A polymer prepared by the polymerization of butene-1 as the sole monomer.

### Polycarbonate Resins

Polymers derived from the direct reaction between aromatic and aliphatic dihydroxy compounds with phosgene, or by the ester exchange reaction with appropriate phosgene derived precursors.

### Polyester

A resin formed by the reaction between a dibasic acid and a dihydroxy alcohol, both organic. Modification with multi-functional acids and/or bases and some unsaturated reactants permit cross linking to thermosetting resins. Polyesters modified with fatty acids are called Alkyds.

### Polyethylene

A thermoplastic material composed of polymers of ethylene. It is normally a translucent, tough, waxy solid which is unaffected by water and by a large range of chemicals.

### Polymer

A high molecular weight organic compound, natural or synthetic, whose structure can be represented by a repeated small unit, the mer; e.g., polyethylene, rubber, or cellulose. Synthetic polymers are formed by addition or condensation polymerization of monomers. If two or more monomers are involved, a copolymer is obtained. Some polymers are elastomers, some plastics.

### Polymerization

A chemical reaction in which the molecules of a monomer are linked together to form large molecules whose weight is a multiple of that of the original substance. When two or more monomers are involved, the process is called copolymerization or heteropolymerization.

### Polyolefin

A polymer prepared by the polymerization of an olefin as the sole monomer.

### Polyolefin Plastics

Plastics based on polymer with an olefin as essentially the sole monomer.

### Polypropylene

A tough, lightweight rigid plastic made by the polymerization of high purity propylene gas in the presence of an organometallic catalyst at relatively low pressures and temperatures.

### Polystyrene

A white thermoplastic produced by the polymerization of styrene (ethyl benzene). The electrical insulating properties of polystyrene are excellent and the material is relatively unaffected by moisture.

### Polyvinyl Acetal

A member of the family of vinyl plastics, polyvinyl acetal is the general name for resins produced from a condensation of polyvinyl alcohol with an aldehyde. There are three main groups: polyvinyl acetal; polyvinyl butyral, and polyvinyl formal. Polyvinyl acetal resins are thermoplastics which can be processed by casting, extruding, molding, and coating, but their main uses are in adhesives, lacquers, coatings, and films.

### Polyvinyl Acetate

A thermoplastic material composed of polymers of vinyl acetate in the form of a colorless solid. It is obtainable in the form of granules, solutions, latices, and pastes, and is used extensively in adhesives, paper and fabric coating, and in bases for inks and lacquers.